SOIL EROSION CONTROL

UPON FIELDS REMOVED FROM COTTON PRODUCTION

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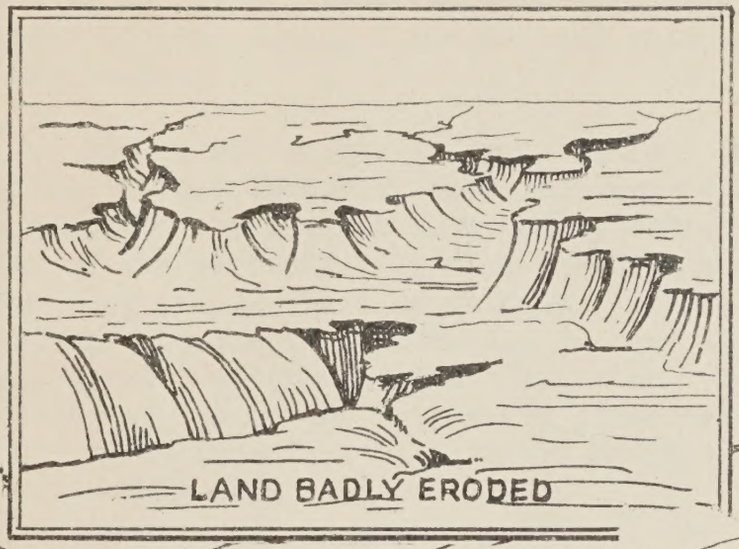
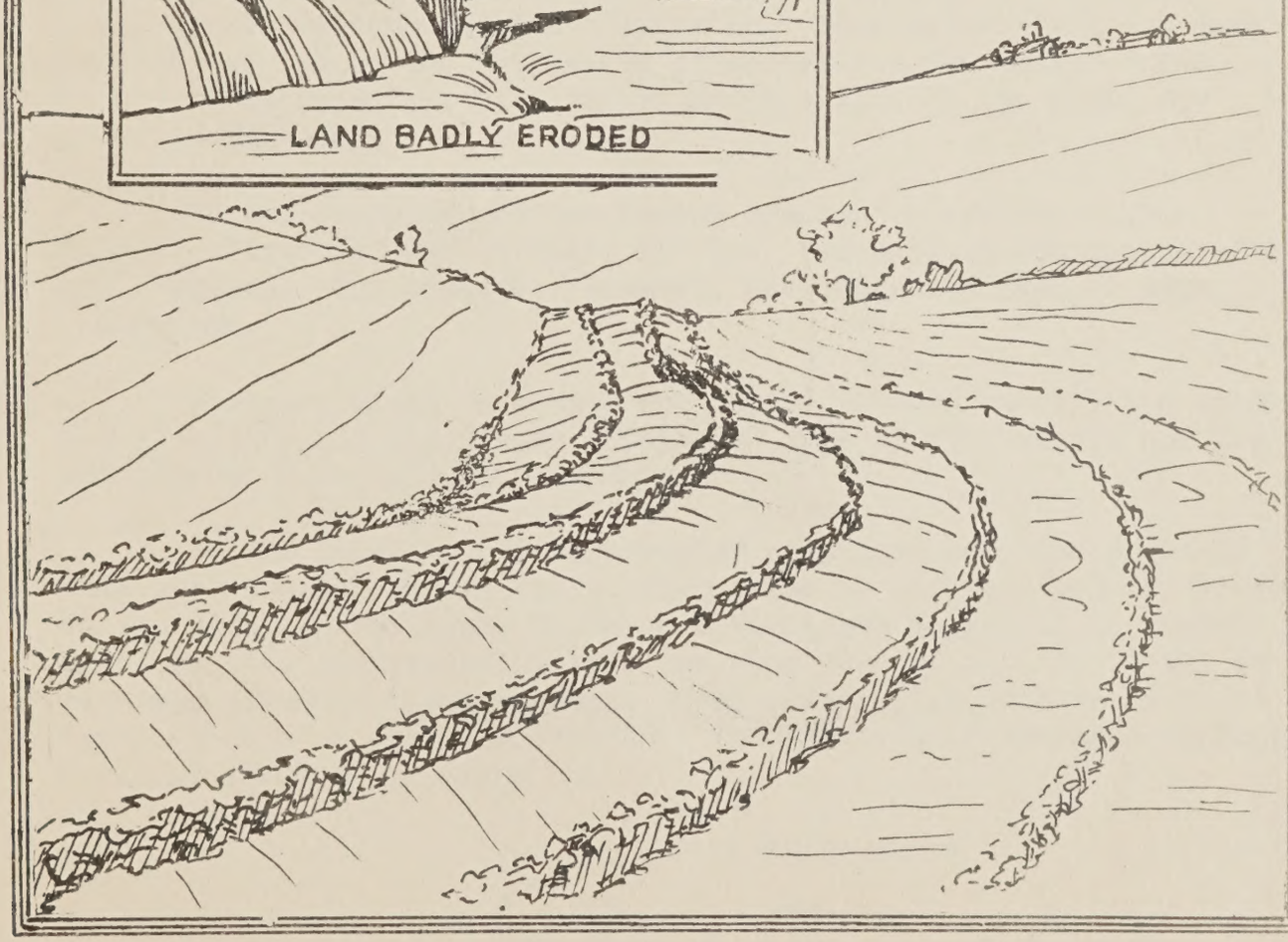
For the
Replacement Crops
Section of the
A. A. A.





UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL ADJUSTMENT ADMINISTRATION
WASHINGTON, D. C.

February 5, 1934.

Dear Sir:

Please note the paragraph on strip-cropping, Page 4, of this paper by Mr. Lyle. Many requests have come to this office for permission to rent cotton lands so that this practice may be adopted or continued.

The farmer offers to rent the land in strips which are to be planted to soil-improving and erosion-preventing crops and terraced where needed. The acres allotted to cotton production under the terms of the contract will be planted in strips between the erosion-preventing crops. This practice has been approved and farmers will be allowed by the Cotton Section to rent 40 percent of a cotton field to the Government under this plan. This method will not only provide for one of the best means of protecting the rented acres from deterioration but will retain average land in the field for cotton production.

"Strip-cropping for overcoming erosion", says Mr. H. H. Bennett, Director, Soil Erosion Service, "is a brand new method with most farmers. The practice, however, has long been used in some localities.

Strip-cropping is simple and cheap; it accords with the teaching of nature and encourages a balanced type of agriculture and the practice of soil-building rotations.

In one locality a strip-cropped area lost only one pound of soil per acre throughout the entire period of eighteen months; whereas, on the same kind of land, where corn was grown according to common practice, the corresponding loss was nine tons of soil per acre, or eighteen thousand times as much. Such a saving is nothing short of revolutionary in its significance. The benefits to American agriculture can scarcely be estimated."

Very truly yours,

J. Phil Campbell

J. Phil Campbell,
Regional Assistant, Replacement Crops Section.

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Prepared by S. P. Lyle,
Sr. Extension Agricultural Engineer, U. S. D. A.
For the Replacement Crops Section of the A. A. A.

The Agricultural Adjustment Administration Replacement Crops Section directs attention to the importance of erosion control in its program relating to cotton replacement acreage. In the year 1933 over 10,300,000 acres of cotton land were removed from production. The program for 1934 sets the goal of 15,000,000 acres to be removed from cotton production, while providing for retention of all the labor, share croppers, and tenants normally employed. Soil conservation work can utilize this labor and the related surplus farm power, but to be effective, before these lands are badly damaged by neglect, it must be done on a wide scale at once. Terracing, contour planting, the use of erosion resistant crops, and gully control by means of checks, dams, and plantings constitute the practices recommended by the Extension Service to effect erosion control.

The removal of 15,000,000 acres from cotton production under the Agricultural Adjustment Administration program presents in that exclusive field a gigantic problem in erosion control. The establishment of pastures and woodlands as effective erosion control measures upon part of this acreage, and the inclusion of level areas and previously terraced fields will account for perhaps 5,000,000 acres, but probably 10,000,000 crop replacement acres continued in cultivation in the Southern States will require immediate terracing and related erosion control measures in order to escape the imminent fate of neglected or abandoned farm lands ravaged and wasted by erosion.

The removal of crop acreage from the usual production program of any farm provides an exceptionally favorable opportunity for the farmer to provide erosion protection for such land, first because the land is free from cash crop production and thus available for carrying the erosion control measures through to completion, and secondly a corresponding portion of the farm labor and farm power remains free to install the terraces and other control works needed. On the other hand abandoned fields are exceptionally vulnerable to the devastating effects of erosion and these valuable fields removed from cash crop production must be preserved from the wastage that is apparent on the millions of acres of once cultivated fields which are now eroded beyond economic reclamation in the United States.

Erosion has been described as sheet erosion and gully erosion. The incipient stage of washing scarcely apparent on a field is called sheet erosion. Gully erosion is the very apparent cutting of water channels and gullies in the soil. The effects of sheet erosion are continually concealed by tillage and cropping operations. Cultivated fields unprotected from erosion commonly lose from 35 to 40 tons of soil an acre annually, without developing very noticeable gullying effects. Six inches or more of top soil have been washed off many cultivated fields in a generation of farm life. Attempts to fertilize and restore fertility on fields affected by sheet

erosion are only temporarily and partially effective, and are wasteful unless erosion protection practices accompany them.

The erosion control practices recommended by the Extension Service will be described here first with reference to the control of sheet erosion by means of terraces, contour farming, and erosion resistant crops; and then with reference to gully control, by means of checks, dams and plantings.

Terracing has been in vogue in the Southern States for many years. Probably 75% of the approximately 100,000,000 crop acres of the Southern States need terraces for erosion protection. Engineers of the United States Department of Agriculture have made field studies of terracing and other run-off and erosion control practices for more than thirty years and have been demonstrating the best method of terracing for almost an equal length of time. State Extension workers have demonstrated terracing from the inception of Cooperative Extension Work. Numerous United States Department of Agriculture and State bulletins have recommended specific effective practices. The cumulative result of this work in the United States has been the terracing of approximately 20,000,000 acres of cultivated land. Of this amount a total of 13,000,000 acres of terracing has been reported by county agricultural agents in the past ten years. A large amount of terracing work has been improperly or incompletely done and much reterracing work is being done at present on such fields by extension workers. But during all this time required to protect 20,000,000 acres of the nation's crop land from erosion, about 50,000,000 acres in the Southern States have been neglected or very poorly protected, and about 10,000,000 acres have eroded beyond economic reclamation.

Terracing is the initial step to take in the conservation of soil, fertility, or rainfall upon cultivated lands, because terraces provide protection continually throughout all seasons and from year to year, during the changes of tillage operations, and the rotations and stages of crop growth which periodically leave fields vulnerable to severe erosion. Terracing stops the major erosion losses by dividing fields into contour drainage areas with slopes of limited length, and drainage channels of less than 6 inches fall in 100 feet. In this way by simple and proven drainage practices the concentration of volume, and the velocity of rainfall run-off is reduced, and soil erosion losses from fields may be limited to from 1/10th to 1/40th or less of the soil losses from similar unprotected fields. With this initial drainage control in operation, contour tillage and planting practices, and erosion resistant and winter cover crops are highly effective in preventing inter-terrace erosion. Terracing is simply the initial step.

The terracing practices recommended are described in United States Department of Agriculture Farmers' Bulletin No. 1669, which in two previous editions and the present third revision has been the principal text on terracing for the past 15 years. Since extension workers and farmers are able to procure this bulletin, and since many demonstrations of the terracing practices recommended therein are widely distributed over the Cotton States, only the order of field work in building terraces will be suggested here.

Terracing Procedure

Surveying.

1. Study the natural drainage of the field, to utilize it in your terracing plan.

2. Plan to control drainage from higher land.

3. Plan the location of terrace outlets and outlet channels.

4. Locate and survey the top terrace first, following instructions in the bulletin.

5. Mark the terrace location with the terracing implement avoiding short curves and big fills.

Construction.

6. Build the first terrace, following instructions in the bulletin.

7. Lay off and build succeeding terraces, spacing terraces close enough to prevent appreciable washing between them.

8. Build terrace outlet drops and channels broad and shallow.

9. Establish perennial sod in outlet channels.

It is good field practice, if found feasible, to perform items 8 and 9 a year in advance of the terracing work in order to provide time for establishing the sod before terrace drainage is diverted to the new channels, however, where sod cannot be established in advance the procedure as outlined is best, as in this way damage to the outlet channels cannot occur during the process of terracing.

The Mangum terrace with a ridge not less than three crop rows in width, and preferably 5 to 7 rows in width, is recommended to facilitate the use of modern farm implements. The three row width is only satisfactory for one mule implements. The channel should have a water capacity that will carry safely a stream of water 1 1/2 feet deep and 12 feet wide. The ridge must be substantial enough to resist the destructive effects of cultivation, gophers and modern erosion. Terraces may be built on a level contour or on any grade up to 6 inches in 100 feet. Most soils erode visibly in terrace channels with more than 4 inches per 100 feet grade. Terraces upon tight soils in humid climates usually show evidence of insufficient drainage when constructed with less than 2 inches per 100 feet grade. Grades of from 2 inches to 4 inches per 100 feet give very general satisfaction. Constant grade or variable grade terraces, as described in the bulletin, should be laid out to carry water in one direction for not more than a distance of 1500 feet. Level grade terraces are used extensively upon open soils and in semi-arid regions to hold the rainfall upon the land upon which it falls.

Contour farming is so called because in that system the crop rows are planted on contours to as great an extent as is feasible. In terraced

fields the contour rows are planted parallel to key rows laid out along each terrace. The contour rows act as miniature terraces retarding the rate of run-off and reducing erosion effects between terraces. Contour farming has been practiced on nearly level dry farming lands without terracing, but even in that area a combination of terraces and contour farming is regarded as necessary, and contour farming alone is regarded as an expedient preliminary to completing a terracing installation.

A practice similar in adaptation is strip cropping, in which a field is planted in alternate contour strips of some row crop and some close growing drilled crop. These strips of sudan grass, cane, wheat, oats, or even alfalfa or other non-row crops in advanced stages of growth have a retarding and filtering effect upon surface run-off. Strip cropping has been practiced by farmers in the southwest in order to place an early maturing forage or grain crop upon terrace locations, to permit early removal of the crop for summer terracing, without disturbing the row crop which might occupy the spaces between terraces until late autumn. Strip or filter crops may be combined with contour rows on terraced lands to reduce erosion movements between terraces.

Erosion resistant crops are recommended as cotton replacement crops because their use promotes economical farm operation. The most erosion resistant crops are perennial pasture grasses, such as Bermuda, and some annual grasses and legumes which have proven satisfactory in permanent pastures. Well sodded pastures, when not overgrazed, reduce erosion losses to inconsequential amounts. Small level grade terraces are helpful in establishing such pastures, and aid in retaining run-off after the pastures are in use.

Annually seeded pastures or meadows of grasses and legumes, or fields planted in forage crops or small grains are very resistant to erosion in advanced stages of the plant growth, but such fields are more vulnerable to erosion losses during the early stages of the crop growth than are fields in contour row crops, hence arises the widely accepted and satisfactory practice of seeding winter cover crops between the rows of corn or cotton in the fall. In this practice terracing, contour farming, and the use of erosion resistant cover crops, and frequently soil improvement crops are combined in one effective system of erosion control and soil improvement.

Gully control practices are recommended for the protection of terrace outlet channels from the severe erosion conditions present in locations along steep grades, and also for the reclamation of abandoned or otherwise unprotected eroding lands. United States Department of Agriculture Farmers' Bulletin No. 1234, "Gullies - How to Control and Reclaim Them," describes a wide variety of gully control works using materials suitable to the many sizes and locations of gullies encountered in field work. Principles to be remembered in constructing gully control works are:

1. The structure must be stable enough to withstand the hydraulic forces it is designed to control.

2. The capacity of the spillway must accommodate flood stages of the watershed without overtopping the structure or sidecutting the embankments.

3. The apron must absorb the energy of the waterfall, releasing the water at approximately zero velocity at the foot of the drop.

4. Successive gully control works in the same channel must be so located with reference to one another that the deposits of soil above the spillway of each will protect the apron of the dam or drop above it from undercutting.

5. Temporary or erosive types of structures must be protected by suitable plantings which will assure a more permanent control of the erosive forces. Suitable vegetative covering is also necessary in connection with permanent types of checks or dams to prevent further erosion of side embankments. Bermuda grass, Kudzu vine, willow, poplar and locust trees, and similar erosion resistant perennial plantings are suggested for this purpose.